storm-center from Lynchburg to Oswego rather than the movement of a well-defined whirlwind at a rapid rate over this mountainous country. The isobars and winds of Tuesday morning show that we have no longer to do with a symmetrical revolving hurricane, but with two, if not three, systems of winds blowing into the region of low pressure and each striving to set up its own independent whirl, namely, southerly winds from New Jersey to Massachusetts, westerly winds in Pennsylvania, and northeasterly winds in Vermont, the Saint Lawrence Valley, and Lake Ontario. Although, as before stated, the weather map was a blank north and west of Maryland and Virginia, yet it was evident that the storm-center had now rapidly passed northward of Maryland; by prediction it should be at least as far north as the boundary between New York and Pennsylvania, and the following general synopsis and forecast was ventured:

The hurricane is probably central in Pennsylvania. The storm-center will move northeast through New York state into the Saint Lawrence Valley.

The map for 8 p. m., 29th, shows that the center was then a little east of Quebec, and possibly within the border of Maine, having moved about 350 miles or more within twelve hours; the isobars now exhibit the great elongation characteristic of the breaking up of a storm. The general conditions and forecast read as follows:

The central calm area has become a long oval, with southwesterly winds on its east side from Massachusetts to the Gulf of Saint Lawrence, and northeasterly winds on its west side at Canadian stations. The current wind velocities average about one-half of those prevailing Monday night. The storm will probably move northeast to Labrador, and may possibly become again powerful after reaching the Atlantic.

The text on the map of 8 a. m. Wednesday, 30th, states that:

The hurricane has moved northeastward down the Saint Lawrence Valley and is now central near the mouth of that river.

Subsequent marine reports do not show the presence of any special storm-center east of Labrador and Newfoundland, and it is probable that this powerful whirl was broken up as such on the 1st of September.

XI.—While the preceding, low area X, was on the 28th passing from Augusta to Lynchburg, the northerly winds and dry air in the Mississippi Valley and the Southwest extended rapidly southward over the Gulf. We have as yet no evidence of the existence therein of any low barometer and cyclonic winds on Monday, but the moderate norther of Monday in the western Gulf, combined with the southerly winds in the eastern Gulf, favored the formation of a moderate barometric depression in the central Gulf which seemed to have prevailed without any general progressive movement from that time until 8 p. m. of the 31st. During these three days the pressure at Port Eads was generally lower than at New Orleans or Mobile, and the tendency toward local and general storms was daily manifest. At one time it was thought that a hurricane would evolve itself out of this indefinite condition, and accordingly at 8 p. m. of the 30th storm-warning signals were displayed from Port Eads eastward to Savannah, but no general storm resulted, although local gusts, waterspouts, and thunderstorms were reported. These conditions continued over into September.

XII.—On the 24th, 8 a. m., a depression apparently existed in northern Alberta, although in fact there was a general depression along a large portion of the Rocky Mountain and Pacific coast regions. The map for 8 p. m. locates a central depression in southern Alberta. This depression stretched southward over California, Mexico, and Texas, although its center continued moving eastward along our northern border. On the 27th, at 8 p. m., it was central between James Bay and Lake Huron, while the hurricane, low area X, was on the coast of Georgia. The subsequent path of that hurricane carried it northward rapidly, and it may be said to have become united with the present low area by 8 a. m. of the 29th. It would, however, be a mistake to speak of this junction as an illustration of the tendency of two cyclones to run into each other and unite. It would seem more proper rather to consider the present indefinite depression, low area XII, as a valley between the two high areas that were on the 27th central over the Rocky Mountain plateau and Nova Scotia, respectively. The movement of low area X was controlled by the nature of the air supplied to it from these two areas of high pressure.

XIII. An indefinite area of low pressure appears on the afternoon of the 30th in Assiniboia and Saskatchewan, by the morning of the 31st it was north of Lake Superior, and its further development belongs to September.

Movements of areas of high and low pressures.

Number.	First observed.			Last observed.			Path.		Average velocities.	
	Date.	Lat. N.	Long. W.	Date.	Lat. N.	Long. W.	Length.	Duration.	Daily.	Hourly.
High areas.		°	°		°	°	*Miles.*	*Days.*	*Miles.*	*Miles.*
I										
II										
III	5, a. m.	51	94	11, a. m.	31	80	1,700	6.0	280	11.7
IV	6, a. m.	47	127	15, a. m.	43	76	2,700	9.0	300	12.5
V										
VI	19, a. m.	44	86	23, a. m.	46	61	1,600	4.0	400	16.7
VII	24, a. m.	50	127	31, a. m.	43	92	2,200	7.0	315	13.1
Mean								6.5	324	13.5
Low areas.										
I	1, a. m.	51	121	5, p. m.	49	67	2,600	4.5	578	24.1
II	4, p. m.	53	120	8, a. m.	48	96	1,400	4.0	350	14.6
III	8, a. m.	55	110	13, p. m.	45	62	2,600	5.5	473	19.7
IV										
V	14, p. m.	39	101	18, p. m.	41	72	1,600	4.0	400	16.6
VI	17, a. m.	52	121	24, p. m.	46	83	2,900	7.5	399	16.6
VII	15, a. m.	33	60	17, p. m.	43	56	1,000	2.5	400	16.6
VIII	16, a. m.	16	65	22, a. m.	48	60	2,700	6.0	450	18.8
IX	21, p. m.	29	85	25, a. m.	50	65	2,400	3.5	699	25.0
X	22, a. m.	23	58	30, a. m.	48	63	3,300	8.0	413	17.2
XI										
Mean								5.1	462	19.9

NORTH ATLANTIC STORMS FOR AUGUST, 1893.

[*Pressure in inches and millimeters; wind-force by Beaufort scale.*]

The paths of storms that passed over the western portion of the north Atlantic Ocean are shown on Chart I, so far as can be traced from information received up to the 25th of September, through the co-operation of the Hydrographic Office and the "New York Herald Weather Service."

The normal pressure for August over the north Atlantic Ocean, as shown by the international simultaneous meteorological observations, is highest, 30.20 (767), in an oval extending from W. 24°, N. 37° to W. 48°, N. 32°; pressure is lowest, 29.70 (754), in a small oval north of Iceland and a second small oval at the northwestern extremity of Baffins Bay.

As compared with July the mean pressure for the current August is higher on the east Atlantic coast, as also in northern Greenland and the extreme northern part of the Atlantic Ocean. The pressure is lower throughout the eastern part of the Atlantic Ocean.

The tracks of storm-centers for August in their passage from the east Atlantic coast toward the coasts of Great Britain and Norway have an average velocity of about 23 statute miles per hour, but the velocity of those moving from the West Indies toward the south Atlantic coast is about 18 miles. The tracks of storms for August may be classified as (I) those which pass up the Gulf Stream over Newfoundland, north of Scotland over Norway and the Gulf of Finland into

the interior of Russia. (II) Those that pass from Bering Sea over southern Alaska, British Columbia, Manitoba, Lake Superior, and Newfoundland, where their track joins that of the preceding class. These storms from Bering Sea have generally pursued an earlier course northeastward along the coasts of China, Japan, and Corea, and in this part of their history resemble the above-mentioned first class which had pursued a northeastward course along the Atlantic coast of the United States. (III) Storms of a third class, comparatively rare, are those that originate in the east Atlantic and, after a short passage westward, recurve toward Portugal, France, and England, where they join the track of those of the first class. (IV) A similar class of infrequent storms originating in the same way includes those that after recurving northeastward strike the Pacific coast of Mexico and California.

During August, 1893, the following storms have been traced over portions of the north Atlantic Ocean; the centers are located for Greenwich noon by simultaneous observations:

A. This storm passed north of Great Britain on August 1st, and over southern Norway and Sweden on the 2d.

B. Was north of Great Britain on the 3d and 4th, and reached Sweden on the 5th.

C. Left the Straits of Belle Isle on the 3d; was at N. 52°, W. 47° on the 4th; N. 55°, W. 30° on the 5th; N. 55°, W. 20° on the 6th; N. 60°, W. 10° on the 7th, after which it moved northward more rapidly, and an area of high pressure moved from the southeastward up over Europe.

D. This whirl apparently developed at the southwest edge of the trough of low pressure attending the preceding; its center may be located as follows: N. 50°, W. 40° on the 5th; N. 51°, W. 31° on the 6th; N. 53°, W. 22° on the 7th; N. 52°, W. 17° on the 8th; N. 50°, W. 18° on the 9th, after which it merged into the greater depression immediately following it.

E. This first appears as a decided low pressure, followed by heavy northwest gales in N. 54°, W. 42° on the 9th; N. 53°, W. 32° on the 10th, with the formation of still another area of low pressure and a special whirl to the westward; N. 56°, W. 20° on the 11th.

F. The track of this can be located as follows: N. 53°, W. 42° on the 10th; N. 50°, W. 37° on the 11th; N. 52°, W. 33° on the 12th; N. 51°, W. 30° on the 13th.

G. There was another whirl of this series that originated in the north Atlantic, and was located as follows: N. 47°, W. 36° on the 14th; N. 51°, W. 33° on the 15th; N. 53°, W. 28° on the 16th; N. 55°, W. 22° on the 17th; N. 59°, W. 20° on the 18th, after which the storm passed over the northern Hebrides and involved a large area in a general whirl whose center was at N. 60°, W. 20° on the 19th, while an area of high pressure advanced from the southeast over Europe and the Mediterranean. The center was about N. 60°, W. 15° on the 20th, and N. 57°, W. 12° on the 21st, and N. 62°, W. 8° on the 22d, after which it passed on to the coast of Norway, and on the 24th had divided into two whirls over the North Sea and the Baltic Sea, respectively; the latter passed southeast into the interior of Russia, being central on the 26th near Saint Petersburg. This low pressure was followed by an area of high barometer, which, on the 23d and 24th, stretched from southern Europe westward to the Atlantic, and thence northward on the 25th to Ireland; pressure remained highest over Great Britain on the 26th to the 31st, being at that time between the Russian area of low pressure and the hurricane that was advancing northeastward over the United States, thereby illustrating the general principle that when a great area of high pressure descends upon the earth's surface it stimulates the development of low pressures and storms on all sides as its denser air is pushed outward along the earth's surface. The northerly winds and heavy sea in the rear of this whirl (*G*) were very severe on the 20th to 22d. A hurricane is said to have passed over the Azores on the 23d, doing great damage, but the marine reports give no intimation of such a storm, and it may have been only a short-lived whirlwind.

H. A hurricane passed on the northeast side of the Bermudas on the 15th and touched the coast of Nova Scotia on the 17th; it is low area VII in the list of United States storms. After that date its path is quite uncertain; it was central at N. 46°, W. 57°, 17th, noon, Greenwich time, and on the 18th at N. 48°, W. 52°, after which it becomes lost or merges into the extensive whirl *G*.

I. The hurricane, low area VIII of the United States storms, that passed over Puerto Rico, August 27, touched Cape Hatteras on the 20th, and the Gulf of Saint Lawrence on the 22d. The locations of its center were, approximately, N. 38°, W. 69°, on the 21st; N. 46°, W. 58°, 22d; N. 52°, W. 48°, 23d; N. 49°, W. 40°, 24th; N. 50°, W. 35°, 25th. After which latter date it seems to have died out in the presence of the high area which was then central west of Ireland.

K. The hurricane that passed over Savannah on the 27th and 28th and reached the Canadian Maritime Provinces on the 30th (United States low area X), was felt as early as the 22d at N. 22°, W. 56°, where a pressure of 28.70 (729) is reported. Its earlier history is as yet problematic, but it is likely to be similar to that of the great Nova Scotia hurricane of August, 1873; both of these seem to have been started by a flow of dry air from northern Africa westward into the ocean. The center passed to the northeast of Newfoundland on the 31st, at which time high pressure prevailed from Ireand westward to the mid-Atlantic, and the storm probably pursued a northerly course, but its subsequent history belongs to the month of September.

OCEAN ICE IN AUGUST.

The following table shows the southern and eastern limits of the region within which icebergs or field ice were reported for August during the last 12 years:

Southern limit.			Eastern limit.		
Month.	Lat. N.	Long. W.	Month.	Lat. N.	Long. W.
	° ′	° ′		° ′	° ′
August, 1882	46 50	46 00	August, 1882	46 50	46 00
August, 1883	43 26	51 41	August, 1883	48 00	44 00
August, 1884	43 24	48 44	August, 1884	47 50	43 50
August, 1885	43 48	52 04	August, 1885	48 03	42 45
August, 1886	48 35	48 46	August, 1886	50 00	48 00
August, 1887	42 21	49 51	August, 1887	48 06	40 00
August, 1888	Straits of Belle Isle		August, 1888	51 33	55 00
August, 1889	43 34	48 38	August, 1889 *	53 00	45 00
August, 1890	42 30	50 21	August, 1890	50 13	39 10
August, 1891	44 07	52 05	August, 1891	47 32	42 45
August, 1892	46 45	53 00	August, 1892	48 43	44 49
August, 1893	44 53	49 21	August, 1893	46 28	46 02
Mean	44 34	50 03	Mean	48 01	44 46

* Isolated field ice in N. 58°, W. 40°.

The above table shows that for August, 1893, ice was reported about the average southern limit of ice for the corresponding month of the last 11 years. The position of easternmost ice reported for the current month was about 1¼° east of the average eastern limit for August.

The limits of the region within which icebergs or field ice were reported for August, 1893, are shown on Chart I by ruled shading.

OCEAN FOG IN AUGUST.

The limits of fog-belts west of the 40th meridian, as reported by shipmasters, are shown on Chart I by dotted shading.

Near the Banks of Newfoundland fog was reported on 24 dates; between the 55th and 65th meridians on 19 dates and west of the 65th meridian on 18 dates. Compared with the corresponding month of the last 5 years, the dates of occurrence of fog near the Grand Banks numbered 3 more than the average; between the 55th and 65th meridians 7 more than the average; and west of the 65th meridian 8 more than the average.